November 18, 2020

Woods v. Raffensperger, et al., **Case No. 1:20-cv-04651-SDG**

United States District Court for Northern District of Georgia

Preliminary Expert Report of Jonathan Rodden, PhD

737 Mayfield Avenue
Stanford, CA 94305

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Jonathan Rodden, PhD

I.   INTRODUCTION AND SUMMARY

Today I received a declaration from Christos Makridis, which makes a variety of claims about fraud and irregularities associated with the 2020 general election in Georgia. I have been asked by Counsel to provide a preliminary assessment of those claims. In this report, I respond to each of Dr. Makridis' claims. Some are mere assertions without citations or they are based on data or vague stories that appear to have been culled from the internet. Others are illogical or fallacious or both. Some appear to be based on basic misunderstandings of the academic literature. None are supported in any way by data analysis. While some of his claims are too vague or illogical to subject to data analysis, others can be easily cast side with rudimentary analysis, which I perform in the report that follows. Overall, it is my opinion that Dr. Makridis' report is unreliable, out of line with the standard practices in the fields of political science, statistics, and the study of election administration, and as a result cannot be used to form any opinions about the integrity of the 2020 elections in Georgia.

II.   QUALIFICATIONS

I am currently a tenured Professor of Political Science at Stanford University and the founder and director of the Stanford Spatial Social Science Lab ("the Lab")—a center for research and teaching with a focus on the analysis of geo-spatial data in the social sciences. In my affiliation with the Lab, I am engaged in a variety

of research projects involving large, fine-grained geo-spatial data sets including ballots and election results at the level of polling places, individual records of registered voters, census data, and survey responses. I am also a senior fellow at the Stanford Institute for Economic Policy Research and the Hoover Institution. Prior to my employment at Stanford, I was the Ford Professor of Political Science at the Massachusetts Institute of Technology. I received my Ph.D. from Yale University and my B.A. from the University of Michigan, Ann Arbor, both in political science. A copy of my current C.V. is included as an Appendix to this report.

In my current academic work, I conduct research on the relationship between the patterns of political representation, geographic location of demographic and partisan groups, and the drawing of electoral districts. I have published papers using statistical methods to assess political geography, balloting, and representation in a variety of academic journals including *Statistics and Public Policy, Proceedings of the National Academy of Science*, *American Economic Review Papers and Proceedings*, the *Journal of Economic Perspectives*, the *Virginia Law Review*, the *American Journal of Political Science*, the *British Journal of Political Science*, the *Annual Review of Political Science*, and the *Journal of Politics*. One of these papers was recently selected by the American Political Science Association as the winner of the Michael Wallerstein Award for the best paper on political economy published

in the last year, and another received an award from the American Political Science Association section on social networks.

I have recently written a series of papers, along with my co-authors, using automated redistricting algorithms to assess partisan gerrymandering. This work has been published in the *Quarterly Journal of Political Science*, *Election Law Journal*, and *Political Analysis*, and it has been featured in more popular publications like the *Wall Street Journal*, the *New York Times*, and *Boston Review*. I have recently completed a book, published by *Basic Books* in June of 2019, on the relationship between political districts, the residential geography of social groups, and their political representation in the United States and other countries that use winner-take-all electoral districts. The book was reviewed in *The New York Times*, *The New York Review of Books*, *Wall Street Journal*, *The Economist*, and *The Atlantic*, among others.

I have expertise in the use of large data sets and geographic information systems (GIS), and conduct research and teaching in the area of applied statistics related to elections. My PhD students frequently take academic and private sector jobs as statisticians and data scientists. I frequently work with geo-coded voter files and other large administrative data sets, including in recent paper published in the *Annals of Internal Medicine* and *The New England Journal of Medicine*. I have developed a national data set of geo-coded precinct-level election results that has

been used extensively in policy-oriented research related to redistricting and representation.[1]

I have been accepted and testified as an expert witness in six recent election law cases: *Romo v. Detzner,* No. 2012-CA-000412 (Fla. Cir. Ct. 2012); *Mo. State Conference of the NAACP* v. *Ferguson-Florissant Sch. Dist.,* No. 4:2014-CV-02077 (E.D. Mo. 2014); *Lee v. Va. State Bd. of Elections,* No. 3:15-CV-00357 (E.D. Va. 2015); *Democratic Nat'l Committee et al. v. Hobbs et al.*, No. 16-1065-PHX-DLR (D. Ariz. 2016); *Bethune-Hill v. Virginia State Board of Elections*, No. 3:14-cv-00852-REP-AWA-BMK (E.D. Va. 2014); and *Jacobson et al. v. Lee*, No. 4:18-cv-00262 (N.D. Fla. 2018). I also worked with a coalition of academics to file Amicus Briefs in the Supreme Court in *Gill v. Whitford*, No. 16-1161, and *Rucho v. Common Cause*, No. 18-422. Much of the testimony in these cases had to do with geography, voting, ballots, and election administration. I am being compensated at the rate of $500/hour for my work in this case. My compensation is not dependent upon my conclusions in any way.

III.   DATA SOURCES

I have collected county-level data on presidential elections for each year from 1988 to 2020 from the Georgia Secretary of State from the following web page: https://sos.ga.gov/index.php/Elections/current_and_past_elections_results

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[1] The dataset can be downloaded at http://projects.iq.harvard.edu/eda/home.

I have also collected 2016 precinct-level data on Georgia from the Metric Geometry and Gerrymandering Group at Tufts University. Finally, I have also consulted my own precinct-level dataset from the 2008 election.

IV.   ANALYSIS

First, in bullet point number 4 of his report, Dr. Makridis points out that Georgia uses a relatively new voting system manufactured by Dominion Voting Systems. He remarks that this system has "a history of technical glitches." He makes no specific allegations about such glitches in Georgia in November of 2020, other than to point out that "roughly 80,000" ballots were "affected" in Gwinnett County. He makes no specific claims about where these numbers come from or what these effects might be, and cites no sources. It seems likely that he is drawing on media reports that election-night counting was delayed in Gwinnett County due to software complications.[2] He also suggests, without evidence or citations, that "it is possible" that there were other "glitches" that went undetected.

Next, in bullet point number 5, he introduces a vague discussion of "glitches" in Morgan and Spalding counties. He makes no specific claim about Morgan County at all, but includes a quote from an election administrator in Spalding County about a "glitch," while providing no citation or context. Here, he appears to be referring to

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[2] https://www.gwinnettdailypost.com/local/a-software-glitch-caused-delays-in-getting-thousands-of-gwinnett-ballots-counted/article_f0e26324-2123-11eb-a16d-837ea9d8cc56.html

an issue not with voting machines, but with e-pollbooks used to check voters in. [3] In any case, Marcia Ridley, who Dr. Makridis quoted making a vague description that the voting technology company "uploaded something last night," later clarified to the local media that she misunderstood, and this did not in fact happen. [4] Dr. Makridis did not provide an update on this in his report.

Next, in bullet point number 6, Dr. Makridis points out that a large number of Georgia voters requested absentee ballots compared with 2016. The increase in absentee ballot requests had to do, of course, with concerns about in-person voting during a pandemic. Dr. Makridis does not make any specific claims about problems with absentee ballots. Rather, he quickly moves on to discuss provisional ballots, and seems to intimate that the number of provisional ballots was somehow large or suspicious in 2020. Without citation, he claims that 14,200 provisional ballots remained to be counted on November 6 at 6 PM. It is hard to know where this number came from, or why it is relevant. According to the Secretary of State's data, there were a total of 11,161 total provisional ballots counted for president in 2020. Given that 2020 was an extremely high-turnout election and attracted a large number of first-time voters, this number of provisional ballots does not seem surprising. It is

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[3] https://www.wsbtv.com/news/local/spalding-county-experiencing-county-wide-glitch-bringing-down-voting-machines/EPCV6RSBRFBLTJUVQXJZAIFO2U/
[4] https://the-grip.net/2020/11/12/voting-machine-glitch-not-caused-by-software-update-investigation-ongoing/

quite common for provisional ballots to be counted last in the days after the election, and there is nothing about the reported number that would indicate that any discrepancy or other issue occurred.

Dr. Makridis includes a discussion of provisional ballots in Mercer County. It is difficult to know what Dr. Makridis might be referring to, since there is no county called Mercer in Georgia. He appears to be citing some statistics from a county in Pennsylvania, and the relevance to this case is unclear.

Next, Dr. Makridis makes the following claim: "It is also curious that the correlation between the number of mail-in votes for Biden net of Trump and the 2016 share of votes for Clinton is stronger than the total votes for Biden net of Trump." This sentence is very difficult to follow, and I have no idea why any such thing would be curious, but let us examine the data. Dr. Markridis seems to suggest that he has calculated the county-level advantage for Biden among mail-in votes, and examined the correlation between that quantity and Hillary Clinton's share of the vote in 2016. In the first panel of Figure 1, I present a scatter plot of that relationship. On the horizontal axis is Hillary Clinton's share of the two-party vote in 2016 in each Georgia county. On the vertical axis is Biden's advantage over Trump in mail-in ballots in 2020. The size of the data marker corresponds to the total number of ballots (of any kind) cast in the county in 2020, in order to give us a sense of the size of the county. The graph shows a strong positive relationship, indicating

that Biden outperformed Trump among mail-in voters in 2020 in the same counties where Clinton outperformed Trump in 2016. This is not the least bit surprising. The next graph is identical, except that the horizontal axis corresponds to Biden's vote share in 2020. Not surprisingly, Biden performs better among mail-in voters in counties where he performs better overall. The third graph appears to be the one that Dr. Makridis has in mind when he writes "the total votes for Biden net of Trump." The horizontal axis now corresponds to Biden's advantage over Trump in raw overall votes. Again, of course, Biden has a larger mail-in advantage in the counties where he has a larger overall advantage.

None of this is surprising and none of it indicates any type of abnormality, as Dr. Makridis appears to insinuate. Dr. Makridis seems to be arguing that the correlation depicted in the first panel of Figure 1 is greater than that in the third panel, and that this is somehow "curious." I have no idea why it would be curious, but in any case, it is not even true. The simple correlation between Biden's mail-in advantage and Hillary Clinton's vote share, illustrated in the top panel in Figure 1, is .48. The correlation between Biden's mail-in advantage and his overall advantage (illustrated in the bottom graph) is .95.

## Figure 1: Scatterplots of Mail-in Democratic Advantage and Overall Democratic Voting
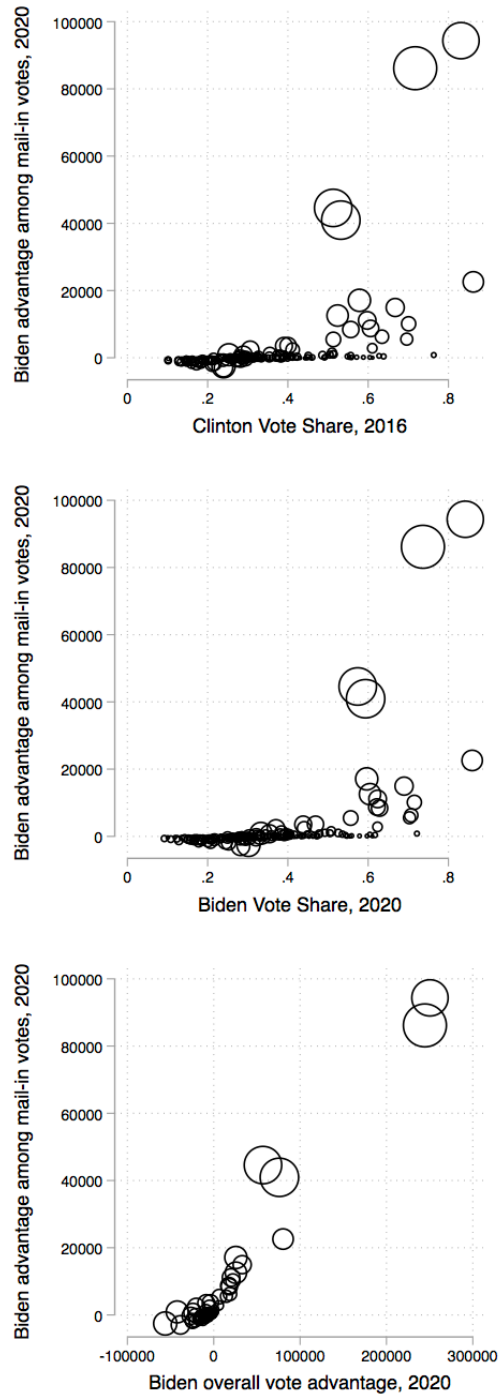
Note: Size of data marker corresponds to total number of votes cast in 2020

Perhaps Dr. Makridis means to suggest that Biden's mail-in advantage was more highly correlated with Clinton's 2016 vote share than was his overall advantage. Again, it is unclear why this would be suspicious, and again, it is untrue. While the simple correlation between Clinton's 2016 vote share and Biden's mail-in advantage was .48, the correlation with his overall advantage is .53. Quite simply, there is nothing surprising or unusual about these correlations, and I have no reason to anticipate that one of these correlations should be higher than the other, and Dr. Makridis provides no explanation whatsoever about how these correlations might relate to allegations of fraud or irregularities.

Perhaps Dr. Makridis means to imply that larger, denser, and more Democratic counties in the top right corners of the graphs in Figure 1 had fewer Republican poll-watchers, and as a result, somehow exhibited unusually high Democratic vote shares, but he provides no evidence that would be consistent with such a claim. It is useful to simply plot Biden's 2020 county-level vote share against Clinton's in 2016. This plot is provided in Figure 2, which again displays data markers for counties according to their size. It also includes a 45-degree line, so that any county that is above the line is one where Biden out-performed Clinton, and any county below the line is one where Biden under-performed Clinton. Figure 2 clarifies that it is simply not true that Biden's gains were concentrated in extremely Democratic counties. We can see that Biden did *not* outperform Clinton in the most

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Democratic counties. His largest gains were in the pivotal suburban counties in the middle of the graph, and he also made substantial gains in counties (many of them also suburban) on the left-hand side of the graph where voters have typically supported Republicans. In general, Figure 2 reveals that Biden's gains were spread broadly throughout the state.

Figure 2: Scatterplot of 2020 Versus 2016 Democratic Vote Share
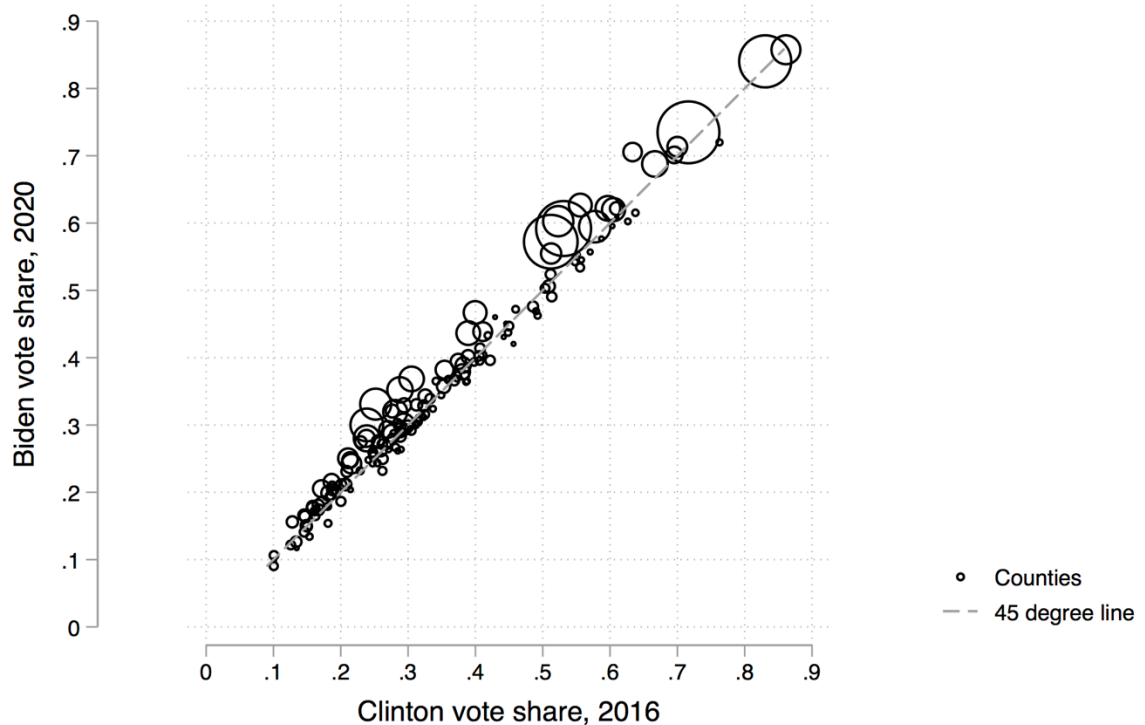
Note: Size of data marker corresponds to total number of votes cast in 2020

In fact, if we regress the *change* in Democratic vote share (from 2016 to 2020) on the 2016 Clinton vote share, the coefficient is not statistically significant from zero. If we weight the counties by population and perform that same regression, the coefficient is *negative* and borderline statistically significant. This means we can

reject the claim that Biden's support increased the most in more Democratic counties. If anything, it actually increased more in more *Republican* counties. This is completely inconsistent with the story about nefarious Democratic election administrators that Dr. Makridis appears to be pushing in his report.

Next, in bullet point 7, Dr. Makridis claims that "the counties with the greatest reported software glitches and delays are also the counties with the biggest swings in votes for Biden." He provides no evidence about how he measures "reported software glitches and delays." He provides no citations to media reports or investigations about glitches or delays. In fact, he only makes oblique mentions of media reports about "glitches or delays" in two counties—Morgan, where Biden received only 29 percent of the vote, and Spalding, where he received 39 percent.

Quickly abandoning his claims about glitches, Dr. Makridis proceeds to provide a table displaying increases in Democratic votes for the most Democratic counties in Georgia from 2008 to 2012, from 2012 to 2016, and 2016 to 2020. Dr. Makridis points out that there were larger increases in Democratic votes in 2020 than in previous elections. What he neglects to mention is that there were also large increases in *Republican* votes in most of those same counties, simply because turnout was extremely and unusually high in 2020. He also neglects to point out that, as indicated in Figure 2 above, Democratic votes increased substantially in many of the most *Republican* counties in the state. Since Dr. Makridis asserts that the mere

observation of a large increase in Democratic voting is sufficient evidence of fraud, it is not clear if Dr. Makridis believes that election administrators in these suburban Republican counties were also involved in the same corrupt practices that he attributes to administrators in more Democratic and urban counties.

Simply because raw votes for the Democratic candidate were higher in Democratic counties than in previous elections, Dr. Makridis makes the stunningly absurd claim that this provides evidence of "a high likelihood of fraudulent alterations within the software or the system" (page 3). Let us conduct the analysis intended by Dr. Makridis in a way that is not patently absurd, and examine the evolution of Democratic vote shares in these counties over time. This is taken up in Figure 3, which displays the evolution of Democratic vote shares over time in the counties highlighted by Dr. Makridis. In these mostly urban and suburban counties, the Democratic vote share has been increasing steadily over time. Perhaps the largest inflection point was in 2008. It is clear that in each of these counties, 2020 was an unremarkable continuation of the trend from previous elections—precisely the opposite of the claim made by Dr. Makridis. The suburban counties where the Democratic vote share was trending upwards, like Cobb and Gwinnett, continued those trends in 2020. As discussed above, in many of the most Democratic counties, the Democratic vote share actually flattened out, falling below what would have been predicted from previous tends, in 2020.

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Figure 3: Democratic Presidential Vote, 1988 to 2020, Selected Georgia Counties
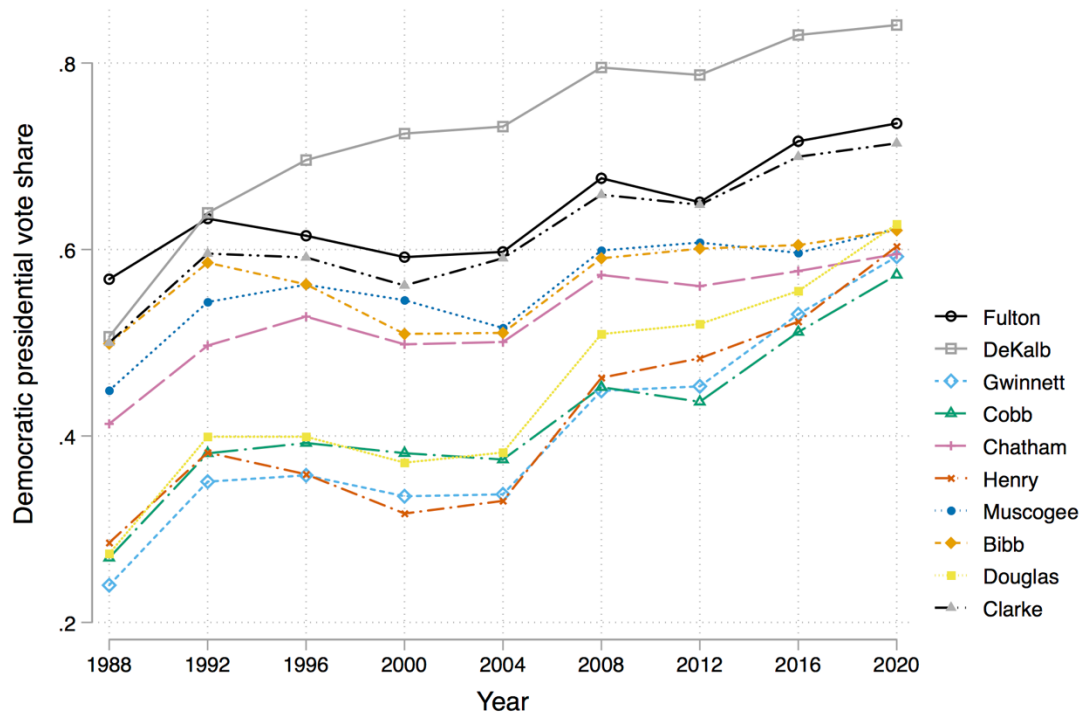
Surprisingly, Dr. Makridis singles out Fulton county (page 4) as a "hotspot for fraud" that he surmises was large enough to sway the overall election outcome. This is a bizarre argument, since Biden's performance was relatively flat in Fulton County relative to his large gains in relatively Republican counties and indeed, relative to his gains in the state as a whole (again, see Figure 2 above).

Next, Dr. Makridis suggests that rural counties "that are on the Northeastern border of Alabama have a much lower increase in Democratic votes for Biden," and should be viewed as some kind of control group. Dr. Makridis believes that the swing in vote share should be uniform across urban, suburban, and rural counties, and it is "suspect" that higher-density suburban areas with more diverse and educated voters

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trended more toward the Democratic candidate in Georgia than rural counties. Evidently Dr. Makridis is unaware that this same persistent pattern—a correlation between population density and Democratic gains—has been identified in almost every U.S. state for decades,[5] and this pattern has continued in 2020, in Georgia and around the United States.

Figure 4: Democratic Presidential Vote and Population Density, Georgia Counties, 1988 to 2020

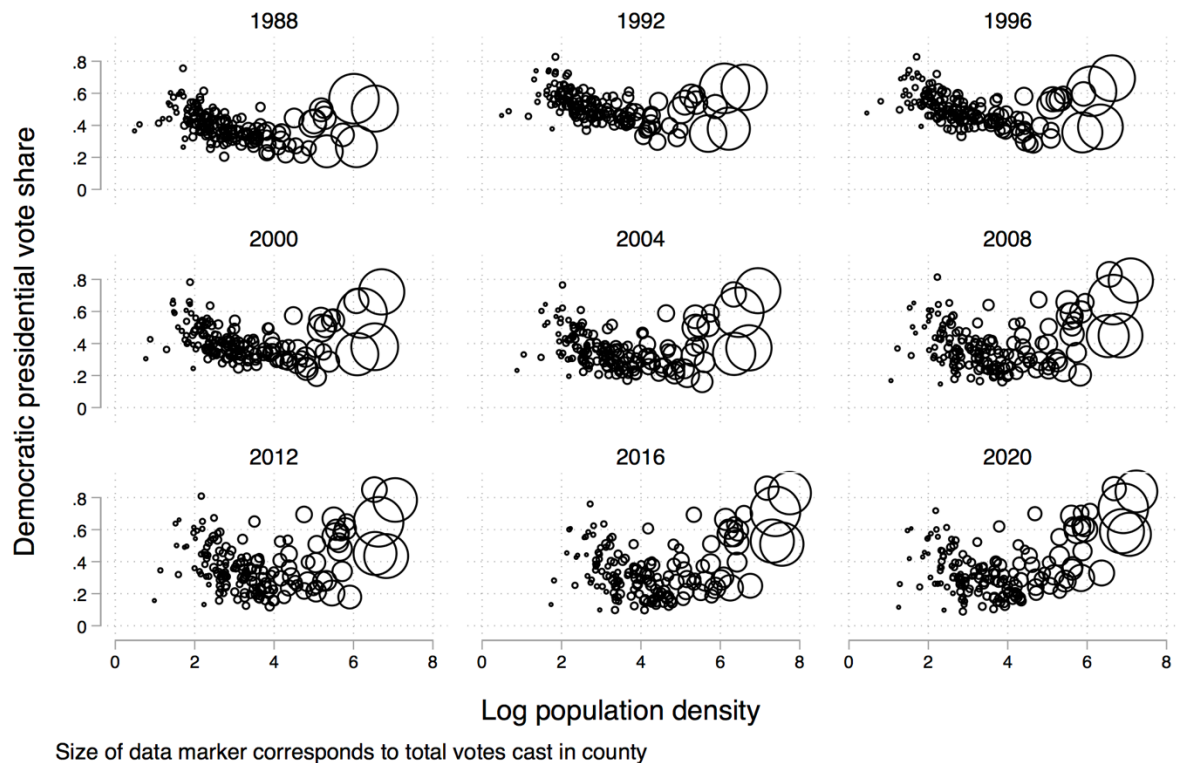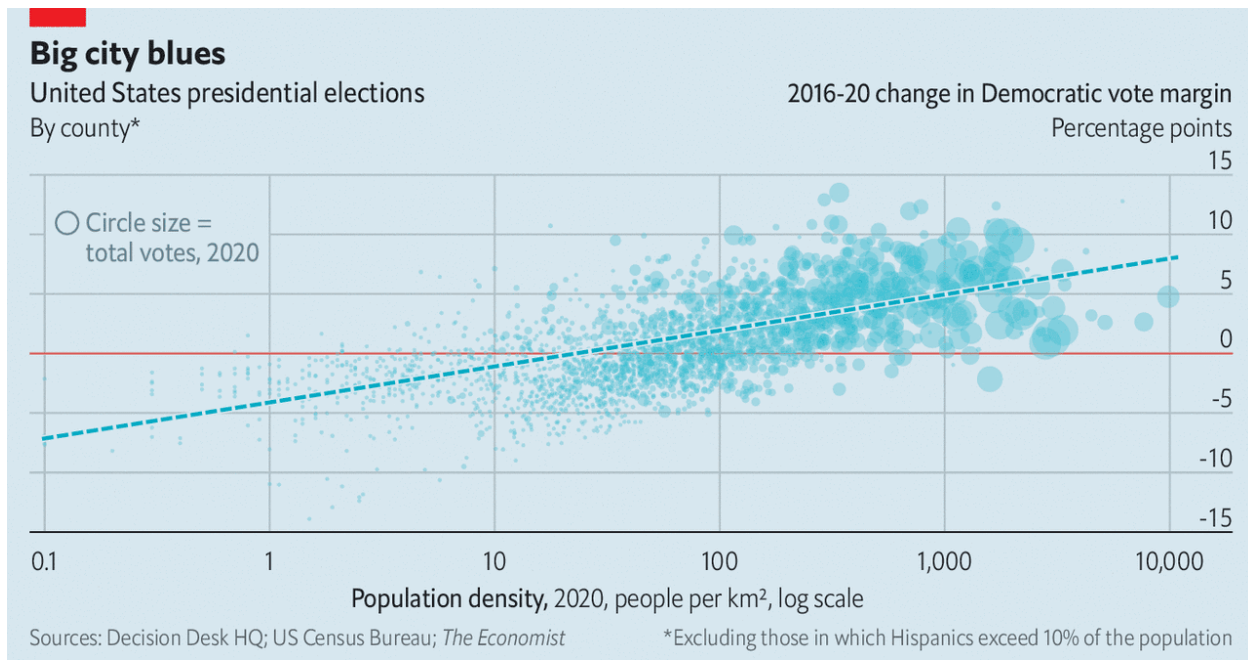Size of data marker corresponds to total votes cast in county

Figure 4 plots the relationship between population density (log scale) and Democratic presidential vote share across Georgia counties from 1988 to 2020. On

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[5] Jonathan Rodden, *Why Cities Lose: The Deep Roots of the Urban-Rural Divide*. Basic Books (2019).

the left side of each graph are low-density majority-African-American counties that vote overwhelmingly for Democrats. But many lower-density counties with larger white populations have become increasingly Republican over time. And higher-density counties on the right side of the graphs have become increasingly Democratic over time. Some of the largest increases in Democratic vote share in 2020 were in higher-density counties in suburban Atlanta. There is nothing in Figure 4 that is remotely indicative of fraud. Rather, 2020 was merely the continuation of a long-term trend— something that any credible social scientist could easily determine with very simple analysis of readily available data.

Figure 5: Population Density and *Change* in Democratic Vote Margin from 2016 to 2020

Big city blues
United States presidential elections
By county*

2016-20 change in Democratic vote margin
Percentage points

Circle size = total votes, 2020

Population density, 2020, people per km², log scale

Sources: Decision Desk HQ; US Census Bureau; *The Economist*   *Excluding those in which Hispanics exceed 10% of the population

The Economist

Figure 5 is taken from a recent article in *The Economist*.[6] It shows that Georgia was

not alone. The Democratic vote share increased in relatively dense, mostly suburban

counties around the United States in 2020. Dr. Makridis wishes to argue that

increased Democratic vote share in suburban Atlanta relative to rural North Georgia

is indicative of vote fraud, even in majority-Republican counties. However, this

pattern can be found in virtually every state, including those that Donald Trump won

handily. Dr. Makridis has provided no explanation about what this nationwide

demographic pattern might possibly have to do with election fraud.

Next, Dr. Makridis argues that it is "highly suspect" that he was able to find a

precinct in Fulton County, and one in DeKalb county, where Biden received 97

percent of the vote. In fact, Democratic vote shares nearing 100 percent are

extremely common in American cities. They are reflections of American geographic

polarization, not election fraud. I have consulted precinct-level results of the 2016

presidential election—one that Dr. Makridis appears to claim was not fraudulent—

and note that there were 130 precincts where Hillary Clinton received over 97

percent of the vote. I have assembled a first-of-its kind nationwide precinct-level

data set for the 2008 election. In that data set, which contains results for over 185,000

precincts, there are well over 6,000 precincts where the Democratic candidate,

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[6] https://www.economist.com/united-states/2020/11/14/our-analysis-of-the-election-results-suggests-that-2020-accelerated-a-long-running-trend

Barack Obama, received over 97 percent of the vote. These urban precincts can be found in the majority of U.S. states. Their existence tells us nothing about election fraud.

Next, in bullet point number 8, Dr. Makridis discusses "Benford's Law," which is a set of observations about the frequency distribution of leading digits in a variety of real-world data sets. Analysts have noticed that in many different types of data sets, it is possible to characterize how frequently the leading digit is likely to be 1, 2, and so on. Financial analysts and accountants have attempted to use these expected distributions to search for fraud. The intuition is that someone who is inventing numbers is likely to be lazy or follow some rule of thumb that creates a set of numbers with a different distribution of first (or second) digits than one typically sees in canonical data sets.

Some scholars have attempted to bring this type of analysis to the study of elections—an area of considerable controversy. For instance, studies using the so-called First Digit Newcomb-Benford Law have come under heavy criticism for electoral applications. Among other reasons, it is widely understood that the first digits of precinct-level vote counts are not useful for trying to identify electoral fraud, in part because they are driven by the number of registered voters in the precinct. It is not reasonable, then, to expect the first digit of precinct-level vote totals to resemble the distributions found in a large set of canonical data sets, for

instance financial records, city sizes, molecular weights, or surface areas of rivers.[7]

It is important to craft one's analysis of digits to the actual data set at hand. The type

of analysis undertaken by scholars in this literature cannot be written up in a breezy

paragraph that lacks crucial details, such as Dr. Makridis' brief exposition on page

4 of his report. Dr. Makridis merely claims that he is using a precinct-level data set

for Georgia with 2,656 observations, and tells the reader that 1,017 precincts are

"suspicious" when we look at "advance" ballots (presumably he is referring to early

voting totals rather than mail-in ballots), and 1,530 precincts are "suspicious" when

he looks at election-day votes. He does not fill the reader on what he means by

"suspicious." He does not explain whether he is using First Digit Newcomb-Benford

Law, Second Digit Newcomb-Benford Law, or something else. It simply does not

make sense in this literature to inform the reader that over half of the precincts

reported "suspicious" numbers. It would be necessary to report distributions of digits

and explore some of the common statistics used in the literature. To my knowledge,

there is not any concept in this literature that remotely corresponds to a claim that

58 percent of the precincts in a large state have "suspicious" digits. In any case, Dr.

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[7] *See* Luis Perrichi and David Torres. 2011. "Quick Anomaly Detection by the Newcomb-Benford Law, with Applications to Electoral Processes Data from the USA, Puerto Rico and Venezuela." *Statistical Science* 26(4):502–516. Water Mebane, Jr., 2014. Can Votes Counts' Digits and Benford's Law Diagnose Elections? In *The Theory and Applications of Benford's Law*, ed. Steven J. Miller. Princeton: Princeton University Press pp. 206–216.

Makridis does not provide any analysis, output, computer code, or data, so there is nothing here to evaluate, other than a rather nonsensical claim. His approach is also inconsistent with other claims in his report, where he surmises that fraud took place only in certain majority-Democratic counties. It makes little sense, then, to anticipate some discernable deviation from a typical digit distribution in the state as a whole. It is not clear why his analysis does not focus on the list of counties, for instance, that he accuses of fraud on page three of his report.

Next, Dr. Makridis claims that it is useful to "detect statistical anomalies" by looking at the distributions of changes in total votes cast from 2016 to 2020 for the two main presidential candidates. He does not explain why he believes we should expect a normal distribution, a skewed distribution, or any other type of distribution on these variables, or why we might view one type of distribution as "suspicious." He provides a histogram of changes in raw Trump votes as well as changes in raw Biden votes. He does not inform the reader about the units of analysis in these figures. Given the numbers on the horizontal axis, it seems likely that these are supposed to be precinct-level results. However, given that changes to precinct boundaries take place quite frequently, it is extremely unlikely that Dr. Makridis has already done the complex geo-spatial analysis needed to weave together a 2016 and 2020 precinct-level data set. If precinct boundaries have changed, it makes little sense to subtract 2016 votes from 2020 votes. The numbers in the tails of the

distributions would be essentially meaningless. If indeed these are meant to be precincts, it is not clear how Dr. Makridis might have dealt with late-emerging precinct consolidations due to COVID.

In any case, in the figure on page 5 of his report, Dr. Makridis presents two histograms, both of which are clearly right-skewed. That is to say, both have a large density of precincts with a moderate number of increased votes in the middle of the figure, and a long right tail—a small set of precincts where the candidate received a relatively large number of additional votes in 2020 relative to 2016. For some reason, Dr. Makridis describes the Trump histogram as "perfectly normal," even though the reader can clearly see that it has a pronounced right skew.

Perhaps Dr. Makridis is trying to claim that the right skew is more pronounced in the Biden histogram than in the Trump histogram. However, he fails to explain why he believes this would be meaningful. One possibility is that precinct consolidations took place disproportionately in urban, Democratic areas, which would lead to much larger Biden votes in 2020 than in 2016 in the precincts that Dr. Makridis was able to match based on name and county (if this is indeed what he has done). It is also the case that Georgia has not increased the number of precincts in the large suburban counties in metro Atlanta, even as population growth has exploded in these counties. As a result, these precincts are far larger than precincts in the rest of the state. Since these are the precincts where Biden's vote share

increased the most, it is not surprising that we would see a long right tail in the distribution of Biden's raw precinct-level vote totals. In all likelihood, his vote shares are increasing the most in the largest precincts, which would create a long right tail in the distribution of Biden vote change. It is very difficult to discern a logic whereby these histograms would tell us anything about election fraud.

Finally, Dr. Makridis expresses concern that there were "surges of votes for Biden" at "odd hours of the morning on November 4th." The incumbent Republican presidential candidate made very strong negative statements about voting by mail, and encouraged his supporters to vote on Election Day. Moreover, provisional ballots very frequently favor Democrats. Thus, every knowledgeable election watcher understood that in states where absentee and provisional ballots were likely to be counted after election-day votes, observers would observe what analysts refer to as a "blue shift" as votes were counted late at night and in the days to follow. This was not the least bit surprising. Dr. Makridis argues that Florida "did not have similar concerns about fraud," and thus did not display evidence of a "blue shift" on election night. However, the obvious explanation is that Florida is accustomed to handling a heavy volume of mail ballots, and has laws that encourage early counting of absentee ballots, for instance by letting counties process absentee ballots weeks in advance. The early results announced in Florida included pre-tabulated mail ballots, which led to early results that were skewed toward Democrats. If Dr. Makridis wishes to

argue that shifts toward one party or another in vote counts over time are indicative

of fraud, he would be required to argue that Florida's election was fraudulent as well.

In reality, there are obvious explanations why different states, and different counties,

would count more Democratic or Republican ballots earlier or later in the counting

process. By no means does this constitute evidence related to fraud.

In conclusion, Dr. Makridis has provided a set of loose conjectures and

innuendo that are difficult to understand or evaluate. His report contains some

snippets of data that have nothing whatsoever to do with fraud or irregularities. He

examines patterns of votes in Georgia that are mere descriptions of what any

qualified political scientist knows about trends in the geography of American

elections, but without explanation, he insinuates that these trends are somehow

indicative of fraud. Dr. Makridis' report contains nothing resembling evidence of

fraud, and there is nothing in the report that could help the Court draw conclusions

about the integrity of the 2020 election.

Jonathan Rodden

Stanford University
Department of Political Science
Encina Hall Central
616 Serra Street
Stanford, CA 94305

Phone: (650) 723-5219
Fax: (650) 723-1808
Email: jrodden@stanford.edu

Personal

Born on August 18. 1971, St. Louis, MO.

United States Citizen.

Education

Ph.D. Political Science, Yale University, 2000.

Fulbright Scholar, University of Leipzig, Germany, 1993–1994.

B.A., Political Science, University of Michigan, 1993.

Academic Positions

Professor, Department of Political Science, Stanford University, 2012–present.

Senior Fellow, Hoover Institution, Stanford University, 2012–present.

Senior Fellow, Stanford Institute for Economic Policy Research, 2020–present.

Director, Spatial Social Science Lab, Stanford University, 2012–present.

W. Glenn Campbell and Rita Ricardo-Campbell National Fellow, Hoover Institution, Stanford University, 2010–2012.

Associate Professor, Department of Political Science, Stanford University, 2007–2012.

Fellow, Center for Advanced Study in the Behavioral Sciences, Palo Alto, CA, 2006–2007.

Ford Career Development Associate Professor of Political Science, MIT, 2003–2006.

Visiting Scholar, Center for Basic Research in the Social Sciences, Harvard University, 2004.

Assistant Professor of Political Science, MIT, 1999–2003.

Instructor, Department of Political Science and School of Management, Yale University, 1997–1999.

Publications

Books

Why Cities Lose: The Deep Roots of the Urban-Rural Divide. Basic Books, 2019.

Decentralized Governance and Accountability: Academic Research and the Future of Donor Programming. Co-edited with Erik Wibbels, Cambridge University Press, 2019.

Hamilton's Paradox: The Promise and Peril of Fiscal Federalism, Cambridge University Press, 2006. Winner, Gregory Luebbert Award for Best Book in Comparative Politics, 2007.

Fiscal Decentralization and the Challenge of Hard Budget Constraints, MIT Press, 2003. Co-edited with Gunnar Eskeland and Jennie Litvack.

Peer Reviewed Journal Articles

Partisan Dislocation: A Precinct-Level Measure of Representation and Gerrymandering, 2020, *Political Analysis* forthcoming (with Daryl DeFord Nick Eubank).

Who is my Neighbor? The Spatial Efficiency of Partisanship, 2020, *Statistics and Public Policy* (with Nick Eubank).

Handgun Ownership and Suicide in California, 2020, *New England Journal of Medicine* 382:2220-2229 (with David M. Studdert, Yifan Zhang, Sonja A. Swanson, Lea Prince, Erin E. Holsinger, Matthew J. Spittal, Garen J. Wintemute, and Matthew Miller).

Viral Voting: Social Networks and Political Participation, 2020, *Quarterly Journal of Political Science* (with Nick Eubank, Guy Grossman, and Melina Platas).

It Takes a Village: Peer Effects and Externalities in Technology Adoption, 2020, *American Journal of Political Science* (with Romain Ferrali, Guy Grossman, and Melina Platas). Winner, 2020 Best Conference Paper Award, American Political Science Association Network Section.

Assembly of the LongSHOT Cohort: Public Record Linkage on a Grand Scale, 2019, *Injury Prevention* (with Yifan Zhang, Erin Holsinger, Lea Prince, Sonja Swanson, Matthew Miller, Garen Wintemute, and David Studdert).

Crowdsourcing Accountability: ICT for Service Delivery, 2018, *World Development* 112: 74-87 (with Guy Grossman and Melina Platas).

Geography, Uncertainty, and Polarization, 2018, *Political Science Research and Methods* doi:10.1017/psrm.2018.12 (with Nolan McCarty, Boris Shor, Chris Tausanovitch, and Chris Warshaw).

Handgun Acquisitions in California after Two Mass Shootings, 2017, *Annals of Internal Medicine* 166(10):698-706. (with David Studdert, Yifan Zhang, Rob Hyndman, and Garen Wintemute).

Cutting Through the Thicket: Redistricting Simulations and the Detection of Partisan Gerrymanders, 2015, *Election Law Journal* 14,4:1-15 (with Jowei Chen).

The Achilles Heel of Plurality Systems: Geography and Representation in Multi-Party Democracies, 2015, *American Journal of Political Science* 59,4: 789-805 (with Ernesto Calvo). Winner, Michael Wallerstein Award for best paper in political economy, American Political Science Association.

Why has U.S. Policy Uncertainty Risen Since 1960?, 2014, *American Economic Review: Papers and Proceedings* May 2014 (with Nicholas Bloom, Brandice Canes-Wrone, Scott Baker, and Steven Davis).

Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures, 2013, *Quarterly Journal of Political Science* 8: 239-269 (with Jowei Chen).

How Should We Measure District-Level Public Opinion on Individual Issues?, 2012, *Journal of Politics* 74, 1: 203-219 (with Chris Warshaw).

Representation and Redistribution in Federations, 2011, *Proceedings of the National Academy of Sciences* 108, 21:8601-8604 (with Tiberiu Dragu).

Dual Accountability and the Nationalization of Party Competition: Evidence from Four Federatons, 2011, *Party Politics* 17, 5: 629-653 (with Erik Wibbels).

The Geographic Distribution of Political Preferences, 2010, *Annual Review of Political Science* 13: 297–340.

Fiscal Decentralization and the Business Cycle: An Empirical Study of Seven Federations, 2009, *Economics and Politics* 22,1: 37–67 (with Erik Wibbels).

Getting into the Game: Legislative Bargaining, Distributive Politics, and EU Enlargement, 2009, *Public Finance and Management* 9, 4 (with Deniz Aksoy).

The Strength of Issues: Using Multiple Measures to Gauge Preference Stability, Ideological Constraint, and Issue Voting, 2008. *American Political Science Review* 102, 2: 215–232 (with Stephen Ansolabehere and James Snyder).

Does Religion Distract the Poor? Income and Issue Voting Around the World, 2008, *Comparative Political Studies* 41, 4: 437–476 (with Ana Lorena De La O).

Purple America, 2006, *Journal of Economic Perspectives* 20,2 (Spring): 97–118 (with Stephen Ansolabehere and James Snyder).

Economic Geography and Economic Voting: Evidence from the U.S. States, 2006, *British Journal of Political Science* 36, 3: 527–47 (with Michael Ebeid).

Distributive Politics in a Federation: Electoral Strategies, Legislative Bargaining, and Government Coalitions, 2004, *Dados* 47, 3 (with Marta Arretche, in Portuguese).

Comparative Federalism and Decentralization: On Meaning and Measurement, 2004, *Comparative Politics* 36, 4: 481-500. (Portuguese version, 2005, in *Revista de Sociologia e Politica* 25).

Reviving Leviathan: Fiscal Federalism and the Growth of Government, 2003, *International Organization* 57 (Fall), 695–729.

Beyond the Fiction of Federalism: Macroeconomic Management in Multi-tiered Systems, 2003, *World Politics* 54, 4 (July): 494–531 (with Erik Wibbels).

The Dilemma of Fiscal Federalism: Grants and Fiscal Performance around the World, 2002, *American Journal of Political Science* 46(3): 670–687.

Strength in Numbers: Representation and Redistribution in the European Union, 2002, *European Union Politics* 3, 2: 151–175.

Does Federalism Preserve Markets? *Virginia Law Review* 83, 7 (with Susan Rose-Ackerman). Spanish version, 1999, in *Quorum* 68.

Working Papers

Federalism and Inter-regional Redistribution, Working Paper 2009/3, Institut d'Economia de Barcelona.

Representation and Regional Redistribution in Federations, Working Paper 2010/16, Institut d'Economia de Barcelona (with Tiberiu Dragu).

Chapters in Books

Political Geography and Representation: A Case Study of Districting in Pennsylvania (with Thomas Weighill), forthcoming 2021.

Decentralized Rule and Revenue, 2019, in Jonathan Rodden and Erik Wibbels, eds., *Decentralized Governance and Accountability*, Cambridge University Press.

Geography and Gridlock in the United States, 2014, in Nathaniel Persily, ed. *Solutions to Political Polarization in America*, Cambridge University Press.

Can Market Discipline Survive in the U.S. Federation?, 2013, in Daniel Nadler and Paul Peterson, eds, *The Global Debt Crisis: Haunting U.S. and European Federalism*, Brookings Press.

Market Discipline and U.S. Federalism, 2012, in Peter Conti-Brown and David A. Skeel, Jr., eds, *When States Go Broke: The Origins, Context, and Solutions for the American States in Fiscal Crisis*, Cambridge University Press.

Federalism and Inter-Regional Redistribution, 2010, in Nuria Bosch, Marta Espasa, and Albert Sole Olle, eds., *The Political Economy of Inter-Regional Fiscal Flows*, Edward Elgar.

Back to the Future: Endogenous Institutions and Comparative Politics, 2009, in Mark Lichbach and Alan Zuckerman, eds., *Comparative Politics: Rationality, Culture, and Structure* (Second Edition), Cambridge University Press.

The Political Economy of Federalism, 2006, in Barry Weingast and Donald Wittman, eds., *Oxford Handbook of Political Economy*, Oxford University Press.

Fiscal Discipline in Federations: Germany and the EMU, 2006, in Peter Wierts, Servaas Deroose, Elena Flores and Alessandro Turrini, eds., *Fiscal Policy Surveillance in Europe*, Palgrave MacMillan.

The Political Economy of Pro-cyclical Decentralised Finance (with Erik Wibbels), 2006, in Peter Wierts, Servaas Deroose, Elena Flores and Alessandro Turrini, eds., *Fiscal Policy Surveillance in Europe*, Palgrave MacMillan.

Globalization and Fiscal Decentralization, (with Geoffrey Garrett), 2003, in Miles Kahler and David Lake, eds., *Governance in a Global Economy: Political Authority in Transition*, Princeton University Press: 87-109. (Updated version, 2007, in David Cameron, Gustav Ranis, and Annalisa Zinn, eds., *Globalization and Self-Determination: Is the Nation-State under Siege?* Routledge.)

Introduction and Overview (Chapter 1), 2003, in Rodden et al., *Fiscal Decentralization and the Challenge of Hard Budget Constraints* (see above).

Soft Budget Constraints and German Federalism (Chapter 5), 2003, in Rodden, et al, *Fiscal Decentralization and the Challenge of Hard Budget Constraints* (see above).

Federalism and Bailouts in Brazil (Chapter 7), 2003, in Rodden, et al., *Fiscal Decentralization and the Challenge of Hard Budget Constraints* (see above).

Lessons and Conclusions (Chapter 13), 2003, in Rodden, et al., *Fiscal Decentralization and the Challenge of Hard Budget Constraints* (see above).

Online Interactive Visualization

Stanford Election Atlas, 2012 (collaboration with Stephen Ansolabehere at Harvard and Jim Herries at ESRI)

Other Publications

How America's Urban-Rural Divide has Shaped the Pandemic, 2020, *Foreign Affairs*, April 20, 2020.

An Evolutionary Path for the European Monetary Fund? A Comparative Perspective, 2017, Briefing paper for the Economic and Financial Affairs Committee of the European Parliament.

Representation and Regional Redistribution in Federations: A Research Report, 2009, in *World Report on Fiscal Federalism*, Institut d'Economia de Barcelona.

On the Migration of Fiscal Sovereignty, 2004, *PS: Political Science and Politics* July, 2004: 427–431.

Decentralization and the Challenge of Hard Budget Constraints, *PREM Note* 41, Poverty Reduction and Economic Management Unit, World Bank, Washington, D.C. (July).

Decentralization and Hard Budget Constraints, *APSA-CP* (Newsletter of the Organized Section in Comparative Politics, American Political Science Association) 11:1 (with Jennie Litvack).

Book Review of *The Government of Money* by Peter Johnson, *Comparative Political Studies 32,7: 897-900.*

Fellowships and Honors

Fund for a Safer Future, Longitudinal Study of Handgun Ownership and Transfer (LongSHOT), GA004696, 2017-2018.

Stanford Institute for Innovation in Developing Economies, Innovation and Entrepreneurship research grant, 2015.

Michael Wallerstein Award for best paper in political economy, American Political Science Association, 2016.

Common Cause Gerrymandering Standard Writing Competition, 2015.

General support grant from the Hewlett Foundation for Spatial Social Science Lab, 2014.

Fellow, Institute for Research in the Social Sciences, Stanford University, 2012.

Sloan Foundation, grant for assembly of geo-referenced precinct-level electoral data set (with Stephen Ansolabehere and James Snyder), 2009-2011.

Hoagland Award Fund for Innovations in Undergraduate Teaching, Stanford University, 2009.

W. Glenn Campbell and Rita Ricardo-Campbell National Fellow, Hoover Institution, Stanford University, beginning Fall 2010.

Research Grant on Fiscal Federalism, Institut d'Economia de Barcelona, 2009.

Fellow, Institute for Research in the Social Sciences, Stanford University, 2008.

United Postal Service Foundation grant for study of the spatial distribution of income in cities, 2008.

Gregory Luebbert Award for Best Book in Comparative Politics, 2007.

Fellow, Center for Advanced Study in the Behavioral Sciences, 2006-2007.

National Science Foundation grant for assembly of cross-national provincial-level dataset on elections, public finance, and government composition, 2003-2004 (with Erik Wibbels).

MIT Dean's Fund and School of Humanities, Arts, and Social Sciences Research Funds.

Funding from DAAD (German Academic Exchange Service), MIT, and Harvard EU Center to organize the conference, "European Fiscal Federalism in Comparative Perspective," held at Harvard University, November 4, 2000.

Canadian Studies Fellowship (Canadian Federal Government), 1996-1997.

Prize Teaching Fellowship, Yale University, 1998-1999.

Fulbright Grant, University of Leipzig, Germany, 1993-1994.

Michigan Association of Governing Boards Award, one of two top graduating students at the University of Michigan, 1993.

W. J. Bryan Prize, top graduating senior in political science department at the University of Michigan, 1993.

Other Professional Activities

International Advisory Committee, Center for Metropolitan Studies, Sao Paulo, Brazil, 2006–2010.

Selection committee, Mancur Olson Prize awarded by the American Political Science Association Political Economy Section for the best dissertation in the field of political economy.

Selection committee, Gregory Luebbert Best Book Award.

Selection committee, William Anderson Prize, awarded by the American Political Science Association for the best dissertation in the field of federalism and intergovernmental relations.

Courses

Undergraduate

Politics, Economics, and Democracy

Introduction to Comparative Politics

Introduction to Political Science

Political Science Scope and Methods

Institutional Economics

Spatial Approaches to Social Science

Graduate

Political Economy of Institutions

Federalism and Fiscal Decentralization

Politics and Geography

Consulting

2017. Economic and Financial Affairs Committee of the European Parliament.

2016. Briefing paper for the World Bank on fiscal federalism in Brazil.

2013-2018: Principal Investigator, SMS for Better Governance (a collaborative project involving USAID, Social Impact, and UNICEF in Arua, Uganda).

2019: Written expert testimony in *McLemore, Holmes, Robinson, and Woullard v. Hosemann*, United States District Court, Mississippi.

2019: Expert witness in *Nancy Corola Jacobson v. Detzner*, United States District Court, Florida.

2018: Written expert testimony in *League of Women Voters of Florida v. Detzner* No. 4:18-cv-002510, United States District Court, Florida.

2018: Written expert testimony in *College Democrats of the University of Michigan, et al. v. Johnson, et al.*, United States District Court for the Eastern District of Michigan.

2017: Expert witness in *Bethune-Hill v. Virginia Board of Elections*, No. 3:14-CV-00852, United States District Court for the Eastern District of Virginia.

2017: Expert witness in *Arizona Democratic Party, et al. v. Reagan, et al.*, No. 2:16-CV-01065, United States District Court for Arizona.

2016: Expert witness in *Lee v. Virginia Board of Elections*, 3:15-cv-357, United States District Court for the Eastern District of Virginia, Richmond Division.

2016: Expert witness in *Missouri NAACP v. Ferguson-Florissant School District*, United States District Court for the Eastern District of Missouri, Eastern Division.

2014-2015: Written expert testimony in *League of Women Voters of Florida et al. v. Detzner, et al.*, 2012-CA-002842 in Florida Circuit Court, Leon County (Florida Senate redistricting case).

2013-2014: Expert witness in *Romo v Detzner*, 2012-CA-000412 in Florida Curcuit Court, Leon County (Florida Congressional redistricting case).

2011-2014: Consultation with investment groups and hedge funds on European debt crisis.

2011-2014: Lead Outcome Expert, Democracy and Governance, USAID and Social Impact.

2010: USAID, Review of USAID analysis of decentralization in Africa.

2006–2009: World Bank, Independent Evaluations Group. Undertook evaluations of World Bank decentralization and safety net programs.

2008–2011: International Monetary Fund Institute. Designed and taught course on fiscal federalism.

1998–2003: World Bank, Poverty Reduction and Economic Management Unit. Consultant for *World Development Report*, lecturer for training courses, participant in working group for assembly of decentralization data, director of multi-country study of fiscal discipline in decentralized countries, collaborator on review of subnational adjustment lending.

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